

Pregnancy-specific stressors as predictors of eating behaviours' (emotional, external and restraint) during pregnancy: Can stressors specific to pregnancy influence one towards unhealthy food choices?

Molly Naughton

0498254

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Dr. Marjolein Missler

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Abstract

The current study investigates predictors of unhealthy eating patterns during the third trimester of pregnancy (n=155). Past research has found many pregnant women do not meet the dietary requirements to support a healthy offspring having detrimental consequences on infant development later in life. Despite there being a wealth of studies investigating the relationship between diet and infant outcomes, and stress and infant outcomes, few studies have investigated these variables in one model. Although it is known that stress changes food preference, less is known about this relationship specific to pregnancy. Therefore, the current study focuses on the association between stress during pregnancy (maternal anxiety (MA) and daily hassles (DH)) and emotional (EE), external (EX) and restraint eating (RE). This study uses data from the longitudinal SMILEY cohort (Study of Microbiota and Lifestyle in the Early Years) at 32 weeks gestation. Results indicate that MA and DH are related to EE and EX, but not RE. Yet, DH did not moderate the prospective relationship between MA and EE or MA and EX. Results highlight differential experiences of stress during pregnancy and their potential relationship to unhealthy eating. Identifying pregnancy-specific stressors as predictors of dietary patterns during the transition to parenthood provides a focal point for target interventions to motivate women towards healthier food choices.

Keywords: maternal anxiety, pregnancy-specific daily hassles, eating behaviours, emotional, external, restraint.

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Investigating pregnancy-specific stressors as predictors of eating behaviours' (emotional, external and restraint) during pregnancy.

Pregnancy can be viewed as an opportunity to create a healthier lifestyle for the benefit of the offspring. Yet, many women fail to meet the optimum nutrition levels necessary for healthy foetal development due to overlooked challenges experienced during pregnancy (Lindsay, Buss, Wadhwa & Entringer, 2019). The World Health Organization has conceptualised “healthy” eating behaviours during pregnancy to include an additional 200-300 calories per day, in surplus of a mothers pre-pregnancy calorie intake (WHO, 2016). Furthermore, they defined a healthy diet as one consisting of mostly plant-based foods, including 3 meals and 2 snacks per day. Stevens et. al. (2021) found meal skipping during pregnancy to be positively correlated with the consumption of high calorific snacks and poor nutrition (Stevens, 2021). Poor quality of nutrition during pregnancy can lead to a number of health problems for mother and baby including growth problems, programming deficits, pre-term birth, diabetes, and even mortality (Marques, O'Connor, Roth, Susser, & Bjørke-Monsen 2013).

Despite the importance of maintaining a healthy diet during pregnancy, Iordachescu (2020) found many mothers do not meet the established guidelines for dietary intake due to unhealthy eating behaviours. In this study of 100 pregnant women, 41% of participants complied with the recommended number of meals per day, 14% ate 2 meals a day and 1 participant reported to eat 1 meal a day. Amongst this sample, 30% of participants who ate less than two meals a day did not meet recommended guidelines for iron, folic acid and other essential vitamins and minerals necessary for healthy foetal development (Iordachescu, 2020). Thus, when the literature so clearly indicates the importance of a good quality diet during pregnancy, why do many women fail to make appropriate food choices?

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Highly stressful life events can alter behaviours and attitudes influencing food choice and food intake. Thus, eating behaviours may act as a proxy for dietary intake (Savage, Hohman, McNitt, 2019). The term ‘comfort food’ is a popular phrase found in the literature to describe changes in food cravings and preferences in response to feelings of stress (Tomiya, Dallman & Epel, 2011). Fats and sugars target the brain in a similar way to opiates and are therefore often sought out during stressful life events altering food preferences (Dallman, Pecoraro, & la Fleur, 2005). For this study, the focus will be on maternal anxiety and pregnancy-related daily hassles as variables of stress that may predict unhealthy eating behaviours. These variables were chosen as differences in stress levels have been identified between pregnant and non-pregnant women due to additional daily stressors experienced uniquely by pregnant women (Zietlow, 2019). Therefore, it is thought that the addition of pregnancy-related stressors may enhance one towards a specific eating behaviour due to the relationship between high stress and unhealthy eating (Savage, 2019).

Maternal anxiety (MA) is a form of emotional stress and relates to ‘concerns and beliefs about the outcome of pregnancy’ (DiPietro, 2009). MA is common during the perinatal period with 11-17% of women experiencing symptoms of pregnancy-related anxiety (Zietlow, 2019). MA is specific to worries around birth and birth outcomes and therefore differs from generalised anxiety. The presence of MA is due to the added level of care, worries about labour and the health of the infant contributing to high cortisol levels (Araji, 2020). What is unclear in the literature is whether MA indirectly impacts foetal outcomes by changing eating behaviours to counteract distress, as it is known that poor nutrition affects infant health (Lindsay, 2019). Whilst pregnancy and motherhood may come as an anticipated event, often the stressors that occur alongside the experience are unanticipated, leading to an increased stress response (Baskin, 2021). High levels of MA during pregnancy can have adverse effects on the mother such as sleep disturbances, irritability, concentration problems

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and energy depletion (Shahhosseini, Poursaghar, Khalilian, & Salehi, 2015). Goncalves and colleagues (2015) identified negative maternal traits and attitudes towards pregnancy to influence poor food choices due to an “emotional eating” coping mechanism to override distress. Exploring the unique association between psychosocial factors specific to pregnancy and eating patterns may provide an understanding of perhaps why pregnant women are influenced towards unhealthy eating.

Daily hassles refer to “thoughts and events which occur alongside negative feelings of annoyance, irritation and frustration making goals harder to achieve” (Ruiz & Fullerton, 1999). In relation to pregnancy, daily hassles might include discussing baby names, weight changes, nausea and physical discomfort (DiPietro, Christensen, & Costigan, 2008). In a longitudinal study conducted on 189 pregnant women, a positive correlation was found between pregnancy-specific hassles and the perception of stress (DiPietro, 2009). Furthermore, DiPietro et. al. (2008) concluded that measuring the daily challenges experienced uniquely during pregnancy highlighted that failure to measure pregnancy-specific stress underestimates the degree to which such women experience distress. When identifying women at risk of unhealthy eating behaviours, there is a gap in the literature as to whether pregnancy-specific stressors may work in conjunction with one another to increase the risk of unhealthy eating, compared to nonpregnant samples. Pregnancy-specific measures of stress have not been commonly included in research focusing on the association between stress and eating behaviours. Yet, given the rewarding properties provided by food and added psychosocial demands that come with pregnancy, it is predicted that highly palatable foods may serve as “comfort foods” to release tension and counteract emotional distress (Baskin, 2021; Yau & Potenza, 2013).

Eating behaviours have been categorized into three subgroups by the Dutch eating behaviour questionnaire (DEBQ; Van Strien, Frijters, Bergers & Defares, 1986). Namely,

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emotional eating (eating in response to emotions rather than hunger itself), external eating (overeating relative to physiological need due to the presence of external stimuli) and restraint eating (limiting the amount of food eaten to prevent weight gain) (Sieber, 2007). Disinhibited eating refers to an increase in the consumption of food despite lack of hunger in response to negative emotional states or presence of highly palatable foods (i.e. external and emotional eating), whereas restraint eating refers to a reduction of food intake (Savage, 2018). Few studies have investigated eating behaviours amongst pregnant women, and of those that have reported conflicting results (Baskin, 2021; Savage, 2019; Nunes, 2014; Easter, 2013). Of the research that has been conducted, disinhibited eating has commonly been positively associated with a poorer diet quality (Chang, 2008; Easter, 2013). One study among 739 pregnant women found 8% of participants increased binge eating during pregnancy in comparison to 12 months prior, whereas restraint behaviours were relatively uncommon with less than 2% of participants reporting to restrict food intake (Easter, 2013). If stress-eating takes place frequently it can result in unhealthy weight changes, increased sugar and fat intake and lower activity levels, all of which put the infant at risk of chronic diseases (Sieber, 2007). Baskin and colleagues (2021) observed when MA was high in trimester one, participants were more likely to engage in restrictive eating patterns, however this showed to reduce across gestation with increases in disinhibited eating patterns. Identifying factors that predict disordered eating may provide an opportunity to identify women at risk and support them in maintaining a healthy diet and prevent negative effects on infant health and birth complications (Baskin, 2021).

Taken together, the literature suggests that pregnancy represents unique challenges that increase experiences of emotional distress (Araji, 2020, DiPietro, 2009). Furthermore, previous reports have shown a considerable percentage of pregnant women do not seem to meet the dietary requirements to support a healthy offspring (Easter, 2013; Iordachescu,

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2020; Stevens, 2021). Despite there being a wealth of studies investigating the impact of diet or maternal anxiety on infant outcomes, few studies have investigated these variables in one model. Although it is known that stress changes the consumption of food, less is known about which types of stressors are related to food intake and whether these have differential effects on dietary behaviour. Therefore, the aim of this study is to investigate eating behaviours during a stressful period, namely pregnancy, and to detect whether these behaviours can be predicted by levels of maternal anxiety and/or pregnancy daily hassles.

Regarding our hypothesis, it is predicted that both maternal anxiety and pregnancy-related daily hassles will be positively related to emotional, restraint and external eating behaviours, primarily due to findings by Baskin and colleagues (2021) who found psychosocial factors specific to pregnancy influence unhealthy eating in pregnant women. Furthermore, given the individual links between MA and perceived stress (Araji, 2020), daily hassles and perceived stress (DiPietro, 2008) and stress and comfort eating (Groez, 2015), it is predicted that pregnancy-specific stressors may work in conjunction with one another to increase the risk of unhealthy eating. Therefore, the second hypothesis proposes that daily hassles will act as a moderator between maternal anxiety and eating behaviours by increasing exposures to stressful experiences, enhancing ones motivation towards a specific eating behaviour.

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Methods

Participants

The participants of this study are part of the longitudinal SMILEY cohort (Study of Microbiota and Lifestyle in the Early Years), initiated by the Baby and Child Research Centre at Radboud University Nijmegen and began in December 2019. In this study, pregnant women were followed from the first half of pregnancy until 12 weeks after birth, with follow-up measurements at 8 months. Participants were recruited via midwifery practices in the Nijmegen and Arnhem (The Netherlands), and social media. Inclusion criteria were as follows (> 18 years old, fluent in Dutch, singleton pregnancy, pre-pregnancy BMI < 30kg/m², no obstetric complications or mental or physical health issues). Recruitment lasted until April 2021. Of the 246 women screened, 202 were eligible. Of these women, 165 enrolled. Twelve were excluded during pregnancy, either due to physical health issues (n=1), obstetric complications (n=4), absence of informed consent (n=4), the pregnancy ended (n=2), or because of unspecified withdrawal (n=1). There were two prenatal (18 and 32 weeks of gestation) and four postnatal measurement rounds (2 weeks, 6 weeks, 12 weeks and 8 months after birth). All prenatal data has been collected and the research team are currently conducting their final postnatal measurement round. During each round, participants completed online questionnaires and collected biological samples (stool samples, saliva samples and breastmilk samples). In addition, the mothers kept a 24h behavioural diary at 6 weeks postpartum. They were invited for three lab visits (at +- 30-32 weeks of gestation, +- 7-8 weeks postpartum, +- 8 months postpartum). For the current analysis, data from 32 weeks gestation will be used. See Table 1 for demographic characteristics.

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Table 1.*Sociodemographic characteristics of participants.*

Sample Characteristics	<i>n</i>	%	<i>M</i>	<i>SD</i>
Education				
Primary	1	0.6		
MBO	13	8.4		
HAVO	4	2.6		
VWO	1	0.6		
HBO	49	31.6		
University	85	54.8		
Other	2	1.3		
Birth Country				
Netherlands	143	92.2		
Other	12	7.8		
Age	155		32.6	3.6
Valid N (listwise)	155			

Procedure

First, a phone took place with interested participants to provide study information and check inclusion criteria. Hereafter, potential participants received information by mail, including information on compensation. This consists of a monetary compensation (€100,-), a small gift for the mother and baby and travel reimbursement. Participants willing to join the study completed a written informed consent form. The study was approved by the Ethics Committee Faculty of Social Sciences at Radboud University under the blanket research line ‘pregnancy-4years Developmental Psychobiology Lab’ (SW2017-1303-497), including two amendments (ECSW-2019-051 and ECSW-2020-021).

Measures

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The following variables were included in this study: Maternal Anxiety, Pregnancy-related Daily Hassles, and Eating Behaviours.

PRAQ-R2

Maternal Anxiety was measured using the Pregnancy Related Anxiety Questionnaire – Revised 2 (PRAQ-R2; Huizink, Delforterie, Scheinin, Tolvanen, & Karlsson, 2016) which was translated to Dutch in the lab by the researchers at the Baby and Child Research Centre. This is a self-report measure of seven items measuring anxiety specific to pregnancy. The items are categorized into two subscales: ‘Fear of giving birth’, for example, “I’m afraid of childbirth” (items 4,6 and 7), and ‘Worries about bearing a mentally or physically handicapped child’, for example, “I am afraid that the baby is mentally handicapped” (items 1,2,3 and 5). Responses can vary from 1 (Absolutely not applicable) to 5 (Very well applicable). Total and factor sum scores were calculated. Total scores (ranging from 10 to 50) can be calculated by summing the individual items. Furthermore, scores for each of the subscales MA (Fears) (3 items, range from 3 to 15), MA (Worries) (4 items, range from 4 to 20) were calculated. Higher scores indicate higher levels of pregnancy-related anxiety. No cut-off point has been recognised for this scale, however, past reports have concluded that scores in the 85th percentile represent high levels of maternal anxiety (Huizink, Delforterie, Scheinin, Tolvanen, & Karlsson, 2016). Internal reliability of the PRAQ-R2 is more than adequate with a Cronbach’s alpha of 0.8 (Cronbachs Alpha; Huizink, 2016) which was mirrored in this study with an internal reliability of 0.7.

PES-Brief

Pregnancy Daily Hassles were measured using the 10 item PES-Brief—*Beleving van Zwangerschap Schaal – verkorte versie* (BZS-K; Van der Zwan, de Vente, Koot, & Huizink, 2017) which is a validated Dutch version of the (Pregnancy Experience Scale – *PES Brief*;

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DiPietro, 2008). The PES-Brief is a shortened version of the 41-item PES scale (DiPietro, Ghera, Costigan, & Hawkins, 2004) which measures the 10 most frequently endorsed daily uplifts and hassles in pregnancy. Items are rated on a 4-point Likert scale for both hassles (how much the item makes the participant feel unhappy) for example, “Your weight”, and uplifts (how much the item makes the participant feel happy) for example, “Conversations with your partner about the baby's name”. Items are rated from 0 (not at all) to 4 (a great deal). This scale consists of 20 items, 10 uplifts and 10 hassles. This study utilised scoring of two different scores. Namely: the intensity of hassles and the intensity of uplifts, calculated as the sum of scale scores (1 to 3) divided by frequency of hassles or uplifts (DiPietro, 2008). To date, no statistical cut-off point has been recognised. Participants in the 85th percentile were said to be affected by high levels of daily hassles. The PES-Brief is a valid and reliable measure with an internal consistency of 0.84 (Cronbachs alpha; Van der Zwan, de Vente, Koot, & Huizink, 2017). The Cronbach’s alpha of this study was adequate with an internal consistency of 0.6.

DEBQ

Eating behaviours were measured using the The Dutch Eating Behavior Questionnaire (DEBQ; Van Strien, 1986) which assesses three eating behaviour subscales, namely; Restrained (If you have gained a bit weight, do you eat less than you are used to?), Emotional (If you have nothing to do, do you feel like eating something?), and External eating (If the food smells good and looks good, do you take a larger portion than you are used to?). This is a 33 item measure with response options ranging from 1 (never) to 5 (very often). Three total scores can be calculated, by summing the individual item scores for each subscale. Subscale items include, Emotional eating (items 1, 3, 5, 8, 10, 13, 16, 20, 23, 25, 28, 30, 32), Restraint eating (4, 7, 11, 14, 17, 19, 22, 26, 29, 31) and External eating (2, 6, 9, 12, 15,

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18, 21, 24, 27, 33). Higher scores indicating greater endorsement of that eating behaviour. Participants in the 85th percentile were said to score highly on that eating behaviour. The DEBQ displays high test-retest reliability and Internal consistency with a Cronbachs alpha of 0.9 (Cronbachs Alpha; Morris, Strömmer, Vogel, Harvey, Cooper, Inskip & Lawrence, 2020). In the context of this study, the internal consistency remained to have excellent reliability with a Cronbach's aloha of 0.9.

Statistical analyses

Firstly, bivariate relationships between maternal anxiety, daily hassles and eating behaviours will be investigated using a Pearson's correlation co-efficient to determine the strengths of associations between subscales. The data will be checked for a normal distribution, which will be tested using the Kolmogorov Smirnov test to determine normal distribution. A Durbin-Watson test will be performed to ensure residual terms are independent. Multicollinearity will be examined by inspecting the variation inflation factor (VIF). Linearity will be investigated by means of a scatterplot for a linear pattern. Homoscedasticity will be confirmed by checking if the residuals are equally distributed with a scatterplot. Any outliers that significantly affect results will be removed. After ensuring assumptions of a linear distribution, collinearity, homoscedasticity and normality are met, a hierarchical regression will be applied three times to investigate the three eating behaviour subscales separately. The independent variables will be: intensity of daily hassles (DH), fears around giving birth (MA: Fears) and worries about bearing a mentally handicapped child (MA: Worries). First, the model will be tested using only the independent variables as predictors (Model 1) and then using the predictor variables with the interaction term (maternal anxiety*intensity of daily hassles; Model 2). All analyses will be conducted using the Statistical Package for Social Sciences for Windows (IBM SPSS, version 27), $\alpha=0.05$.

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Results

An analysis of standard residuals was carried out in which the data displayed no presence of outliers (Std Residual Min =-2.07, Std Residual Max=3.1). The data meets the assumption of collinearity in which multicollinearity is not a concern as all VIF values lay below the threshold. The Normal P-P plot of regression standardized residuals showed a linear distribution of data points. The scatterplot of standardized residuals showed that the data meets the assumptions of homogeneity of variance and linearity. Descriptive statistics are displayed below in table 2. Participants scored highest in emotional eating (EM) with 18% of participants scoring in the 85th percentile. 21.2% of participants scored in the 85th percentile for external eating (EX) and 18.7% of participants scored above this threshold for restrictive eating. Maternal Anxiety (MA) levels were high in this sample with 16.7% of participants in the 85th percentile. 23.8% reported to be in the 85th percentile of fear around giving birth and 20.6% reported in the 85th percentile of worries around bearing a handicapped child. The DU was greater than DH, suggesting more positive than negative pregnancy experiences within this sample. 18.1% of participants scored in the 85th percentile of experiencing high amounts of DU and 16.12% scored in this percentile for DH.

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Table 2.*Descriptive Statistics for study variables*

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Daily Up.	155	1.77	1.33	3.10	2.3403	.41828
Daily Hass.	155	2.55	.25	2.80	1.4068	.42899
MA (Fears)	155	11.00	3.00	14.00	6.1355	2.5305
MA (Worries)	155	15.00	4.00	19.00	7.9613	2.8894
MA (Total)	155	18.00	7.00	25.00	14.096	4.263
Emotional EB	155	49.00	13.00	62.00	31.584	9.446
Restraint EB	155	31.00	10.00	41.00	24.929	7.5275
External EB	155	24.00	18.00	42.00	29.768	5.3170
Valid N (listwise)	155					

Bivariate Correlations: Eating Behaviours (EB), Daily Hassles (DH), Maternal Anxiety (MA)

A moderate to strong relationship was found between MA (Fears) and DH where $r=0.3$, $p<0.01$. A small negative correlation was found between MA (Fears) and DU where $r=-0.2$, $p<0.01$. Furthermore, a positive correlation was found between MA (Worries) and DH where $r=0.27$, $p<0.01$. A strong positive relationship was found between MA (total) and EE where $r=.383$, $p<0.01$. A small positive correlation was found between EE and MA (Fears) where $r=0.21$, $p<0.01$ and for EX and MA (Fears) where $r=0.19$, $p<0.05$. See Table 3.

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Table 3*Correlation coefficients for study variables*

Variable	1	2	3	4	5	6	7	8
1. Daily Up								
2. Daily Hass	-.195*							
3. EmotionalEB	-0,083	0.13						
4. Restraint EB	0.097	0.066	.294**					
5. External EB	0.013	.195*	.460**	0.127				
6. MA (fears)	-.237**	.342**	.220**	0.018	.031			
7. MA (worries)	-0.046	.266**	0.081	0.043	.198*	.234**		
8. MA (Total)	-0.172*	.383**	.185*	.040	.153	.752**	.817**	

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Multiple Regression: Maternal anxiety and daily hassles as predictors of Eating behaviours.

To test the hypothesis that MA and DH predict Eating behaviours (Emotional, External and Restrictive), and more specifically, that the association between MA and the different types of eating behaviours is moderated by DH, several hierarchical multiple regressions were conducted.

The first hierarchical regression investigated MA and DH as predictors of Emotional Eating (EE). In step one MA (Fears), MA (Worries) and DH were entered into the regression model explaining 5% of the variance in EE ($F(3,150)=2.5$, $p=.06$, $R^2 =0.05$, $R^2(\text{Adjusted})=0.03$). MA (Fears) was the only significant predictor of EE in this step where ($\beta =0.18$, $p<0.05$). In step two, the interaction term between DH and MA (fears) was examined as both of these variables had a main effect in step one. The model in step two was insignificant ($F(1,149)=0.1$, $p>0.05$, $R^2=0.05$, $R^2(\text{Adjusted})=.02$, $\beta = .13$, $t(148)= .35$, $p>0.05$). Furthermore, with the addition of the interaction term, MA(Fears) no longer had a main effect on EE. Therefore indicating that increasing fears around childbirth may be related to emotional eating behaviours, but this relationship is not moderated by daily hassles.

A second hierarchical regression was conducted to investigate MA and DH as predictors of External Eating Behaviours (EX). In step one, MA (Fears), MA (Worries) and DH were entered into the regression model explaining 7% of the variance in EX ($F(3,150)=3.5$, $p<0.05$, $R^2 =.07$, $R^2(\text{Adjusted})=.05$). In this step, MA (Worries) ($\beta =0.18$, $p<0.05$) and DH ($\beta=0.18$, $p<0.05$) were both found to have a main effect on EX. In step two, the interaction term between DH and MA (Worries) was added to the model as MA (fears) had no main effect. This model was found to be insignificant where ($F(4,149)=2.7$, $p>.05$, $R^2 =.07$, $R^2(\text{Adjusted})=.04$, $\beta =-0.06$, 95% CI [-0.25,0.2], $t=-.2$, $p=.8$). Furthermore, MA (Worries)

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($\beta=.2$, $p=.4$) and DH ($\beta=.2$, $p=.3$) were no longer found to have a main effect. Therefore, despite influencing EX independently, the relationship between worries around bearing a handicapped child and external eating behaviours is not moderated by the intensity of daily hassles.

The final hierarchical regression was used to investigate MA and DH as predictors of restraint eating (RE) behaviours. In step one, MA (Worries), MA (Fears) and DH were entered into the regression. The results from the first step revealed this model not to be significant ($F(3,150)=.4$, $p>.05$, $R^2=.01$, $R^2(\text{Adjusted})=-.01$). In the second step, the interaction effects between DH and MA (worries) and DH and MA (fears) were examined. No interaction was found between MA (fears) and DH where ($\beta = 0.67$, $t(148)=1.6$, $p=0.9$). However, the interaction term between MA (worries) and DH was found to be significant where ($\beta = -0.77$, $t(148)=-2.1$, $p<0.05$), yet the model was not significant ($F(2,148)=2.6$, $p=0.07$, $R^2=.03$, $R^2(\text{Adjusted})=0.01$).

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Discussion

This study aimed to investigate the association between maternal anxiety and daily hassles with three different eating behaviours; emotional, external, and restraint. Furthermore, this study examined whether the presence of pregnancy-related daily hassles would moderate the relationship between maternal anxiety and eating behaviours.

The first hypothesis proposed that maternal anxiety and daily hassles would significantly predict external eating patterns. Indeed, results showed that worries around bearing a handicapped child and daily hassles were significantly related to external eating behaviours. Research into external eating during pregnancy is scarce. Of the research that has been conducted, maternal stress has been associated with enhanced snacking and comfort eating of palatable calorific foods (Lindsay, 2019). However, past research has often failed to differentiate between external and emotional eating. What has been found is that external eating is positively associated with excess weight gain and can act as a barrier to healthy eating during pregnancy (Savage, 2019). In the context of this study, reports of external eating were high and related to high levels of anxiety and daily hassles, confirming our prediction that high-stress influences the consumption of food in the immediate environment. Thus, opening a window to future research on external eating patterns during pregnancy and how it may be influenced by pregnancy-specific stress.

Secondly, consistent with the hypothesis, emotional eating behaviours were found to be significantly predicted by fears around childbirth. Psychosomatic theory of emotional eating suggests individuals may struggle to differentiate feelings of hunger and unpleasant internal sensations, in which they respond to stress by overeating (O'Connor, 2008). In line with this, our findings suggest that psychosocial influences during pregnancy may increase food consumption to remove negative emotional states caused by fears around childbirth.. Interestingly, no relationship was found between emotional eating and worries around

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bearing a handicapped child, indicating that emotional eating is more influenced by anxiety around the mother's experience of childbirth rather than child outcomes. In relation to daily hassles, the null hypothesis was accepted as no significant relationship was found with emotional eating. This was surprising as daily hassles were shown to be positively associated with maternal anxiety, which mirrors past research (Baskin, 2021; DiPietro, 2009). Therefore, it was hoped that our results would correspond with research conducted by Baskin et. al. (2021), where maternal stress increased motivation towards emotional eating. The lack of an association between daily hassles and emotional eating may be explained by the sample used, who perhaps did not experience a large number of daily hassles motivating one towards emotional eating.

Contrary to the hypothesis, restraint eating was not found to be significantly predicted by either maternal anxiety or daily hassles. Research in this area is contradictory. Easter et. al. (2015) found increases in restraint eating during pregnancy only in participants with a history of dieting. In our study, neither maternal anxiety nor daily hassles were related to restraint eating. This mirrors past research where mothers reported eating more than they did pre-pregnancy, despite psychosocial stress (Nunes 2014; Savage, 2019). Restraint eating has shown to be more prevalent in post-partum studies, where mothers reported to maintain food intake during pregnancy to protect the foetus, but to eat less up to three months post-partum due to weight concerns and lifestyle changes (Nunes, 2014). One interpretation of the current findings is that the foetus may act as a protective factor against restrictive eating despite high stress, as too little energy may harm infant health (Lindsay, 2019).

It was further hypothesized that daily hassles would act as a moderator in the relationship between maternal anxiety and eating behaviours. The current findings did not support this hypothesis. Despite daily hassles independently predicting external eating behaviours, it did not moderate the maternal anxiety and maladaptive eating behaviour

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relationship. Several plausible biological and psychological studies have been conducted to explain how stress and hassles promote enhanced snacking and influence unhealthy food choices (Oliver, 1999; Savage, 2019; O'Connor, 2008). For example, O'Connor (2008) suggested that daily hassles enhance emotional stress which can disrupt the regular pattern of eating by increasing the desire to eat, even when satiated. Consequently, it was hypothesized that daily hassles would enhance the negative effects of maternal anxiety across all eating behaviours by increasing the experience of emotional distress. However, this was not the case. Several factors may explain this lack of a moderating effect, such as the high levels of daily uplifts experienced by this sample, reducing maternal stress (DiPietro, 2008). Furthermore, the trimester in which the data was collected may have impacted results as Savage et. al. (2019) found variation in the perception of stress and eating habits across gestation. For example, nausea is common during the first trimester which may impact food choice compared to the third trimester, when the foetus is larger resulting in the need for more energy and calorie consumption (Baskin, 2021; Savage, 2019).

Strengths and Limitations

Strengths of this study include the contribution to eating behaviour research in pregnant women. Existing research mostly focuses on emotional eating behaviours only, whereas this study provides an overview of three subscales of eating behaviours. The high scoring on external eating behaviours in this study creates room for future research as current literature in this area is scarce. An important strength of this research is that it highlights how different stressors affect different eating behaviours. For example, daily hassles showed to influence external eating but not emotional or restraint eating. An important limitation of this study is that the results are based on only one measure of eating behaviours (namely at 32 weeks of pregnancy). Therefore, it is not possible to conclude an association between stress

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and an 'unhealthy dietary pattern' from the variables used. Future research may want to include a daily food diary to monitor foods consumed relative to each eating behaviour.

Conclusion

To conclude, the findings of this study reinforce the importance of examining risk factors for unhealthy eating behaviours. Despite the limitations, the current study enhanced an understanding of the relationship between maternal stress and eating behaviours, such that both maternal anxiety and daily hassles are associated with disinhibited (rather than restrictive) eating behaviours. As mirrored by past research, emotional eating and maternal anxiety scores were high. Continued research is necessary to advance beyond this current research, but this study is one of few that recognizes external eating behaviours in pregnant women as potentially being responsible for unhealthy food choices. Interventions therefore may want to target the environments that surround pregnant women to improve food choices. Furthermore, future analyses may want to compare eating behaviours during the three trimesters of pregnancy and identify at what times are anxiety levels highest and when are unhealthy eating behaviours are most likely to develop, possibly through semi-structured interviews to gain a better insight. This way, target interventions can be created to motivate women towards healthier food choices, with health benefits for both mother and child.

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Student ID:	0498254
Initials & prefix:	M.N
Last name:	Naughton
Master	MSc Clinical Psychology
<i>Thesis Supervisor</i>	
Name of Supervisor	Dr. Marjolein Missler
Thesis	
Thesis Title	Investigating pregnancy-specific stressors as predictors of eating behaviours during the third trimester of pregnancy.
Language of thesis	English
Abstract	The current study investigates predictors of unhealthy eating patterns during the third trimester of pregnancy (n=155). Past research has found many pregnant women do not meet the dietary requirements to support a healthy offspring. Despite there being a wealth of studies investigating the association between diet and infant outcomes, and stress and infant outcomes, few studies have investigated these variables in one model. Although it is known that stress changes food preference, less is known about this relationship specific to pregnancy. Therefore, the current study focuses on the association between stress during pregnancy (maternal anxiety and daily hassles) and emotional, external and restraint eating. This study uses data from the longitudinal SMILEY cohort (Study of Microbiota and Lifestyle in the Early Years) at 32 weeks gestation. Results indicate that maternal anxiety and daily hassles are related to disinhibited rather than restrictive eating behaviours. No interaction effects were found for daily hassles and maternal anxiety predicting maladaptive eating behaviours. The findings of this study enhance our knowledge of how mothers may be influenced towards unhealthy eating. Identifying pregnancy-specific stressors as predictors of dietary patterns during the transition to parenthood provides a focal point for target interventions to motivate women towards healthier food choices.
Keywords	Maternal anxiety, Pregnancy-specific hassles, Eating behaviours, External, Emotional, Restraint
Make publicly accessible	yes

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